Calibrating the VIMOS Redshift Survey Data

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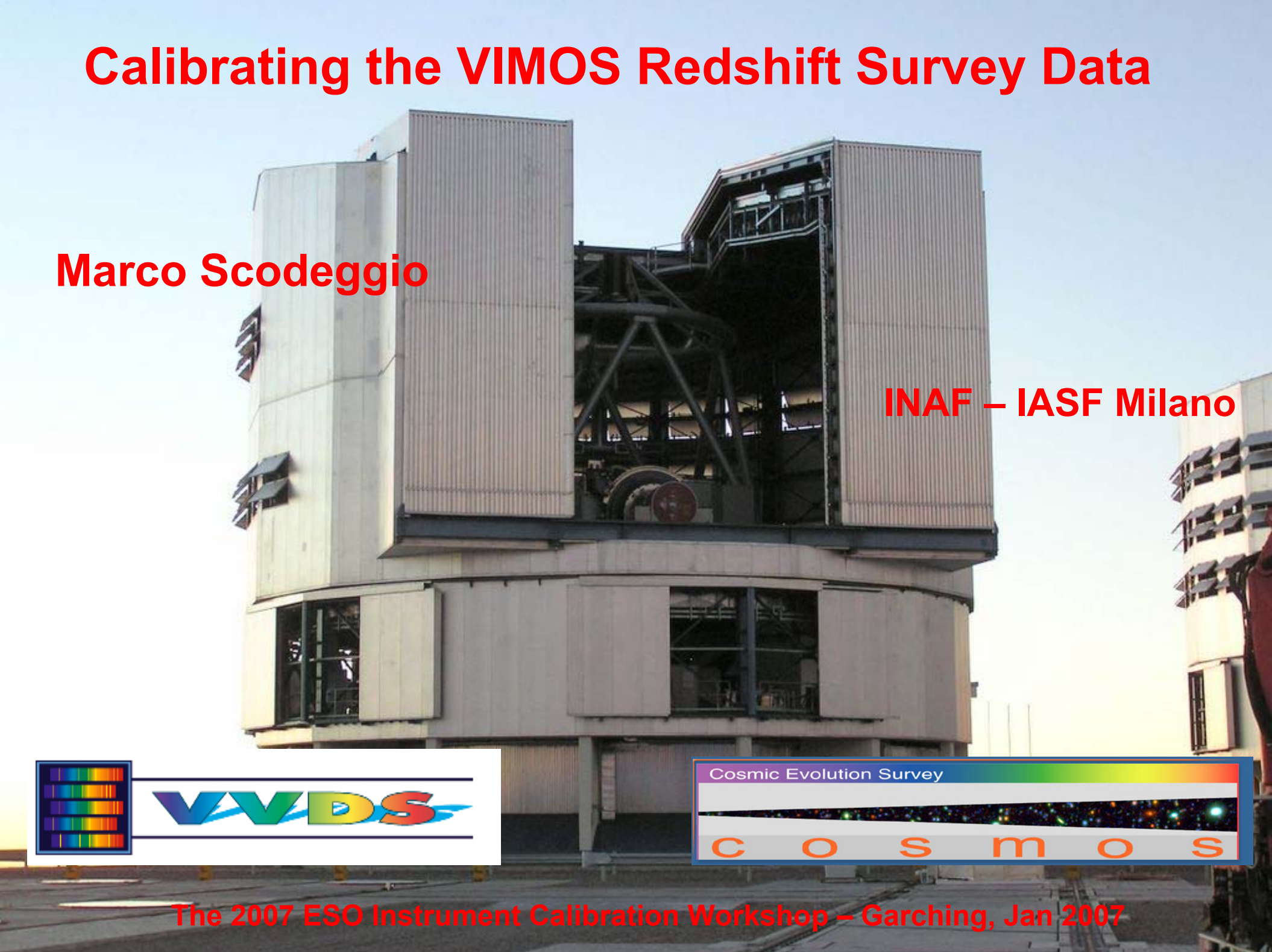


The 2007 ESO Instrument Calibration Workshop – Garching, Jan 2007

VVDS: The VIMOS VLT Deep Survey

- **4 fields**, 2x2 deg² each, ~100Mpc @z~1; 1 deep field (I_{AB}< 24.0) + 3 "wide" ones (I_{AB}< 22.5)

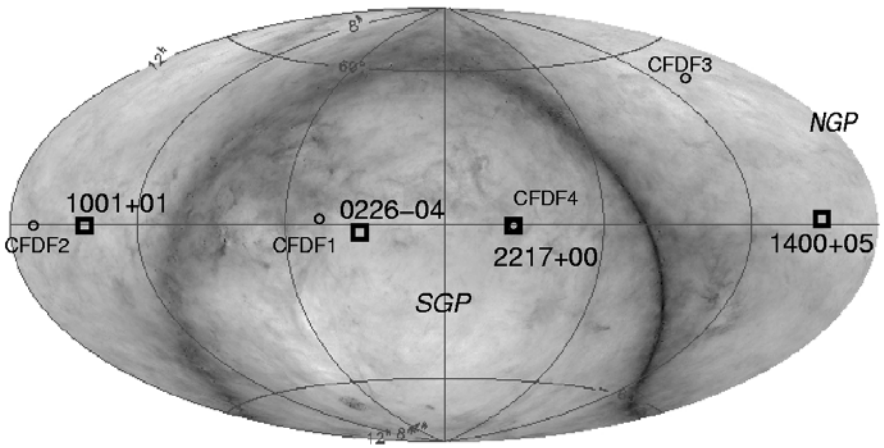
  Minimize cosmic variance

- **Magnitude selected sample**

  Attempt completeness in luminosity at each redshift: complete census of galaxy population

  Away from small color selected samples: relate populations at different redshifts

  Price to pay: stars, going inside "redshift desert", lots of "low" z~0.5-1.2 galaxies

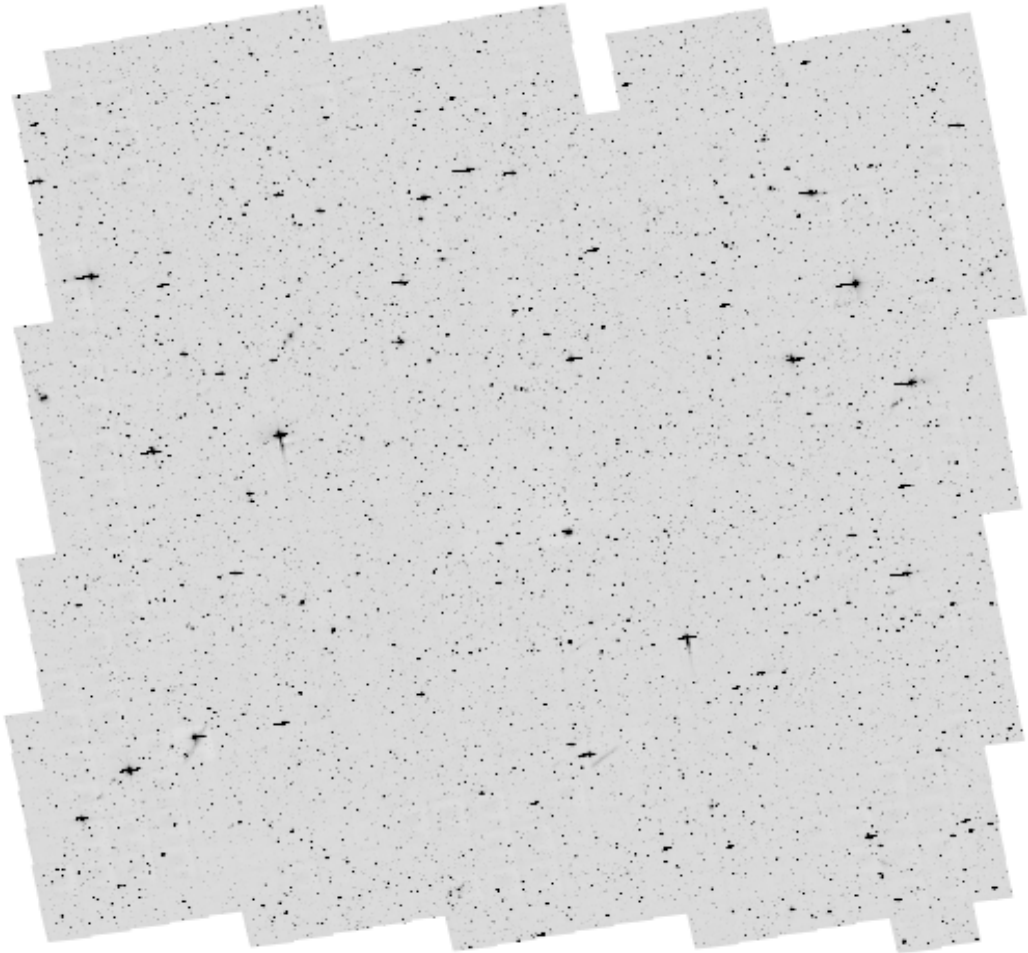


- **150000 redshifts 0<z<5+**

- Foster multi-wavelength observations on VVDS fields: VLA, XMM, GALEX, Spitzer

COSMOS: The Cosmic Evolution Survey

- **1 field**, 1.4x1.4 deg²
- Fully covered with HST-ACS images in I-band (F814W) **590 HST orbits** !!!
- Very deep multiband photometry (UbgVrizJHK + 8 narrow/intermediate bands). Final goal: COSMOS-22 from Subaru + CFHT telescopes
- multi-wavelength observations : VLA, JCMT, ALMA, XMM, Chandra, GALEX, Spitzer



- **Redshift coverage: 40,000 redshifts at 0<z<1.3 + 1.5<z<3.0**

The VIMOS Data Reduction Pipeline

The VIMOS
Data Reduction Software

Pipeline building blocks
(150,000 lines of C code)

The ESO Pipeline

GASGANO / Esorex +
ESO VIMOS Pipeline
Recipes

VIPGI

VIMOS Pipeline Recipes +
GUI + Data Organizer
(20,000 lines of Python)

EZ
Redshift measurement
tool
standalone / VIPGI integr.

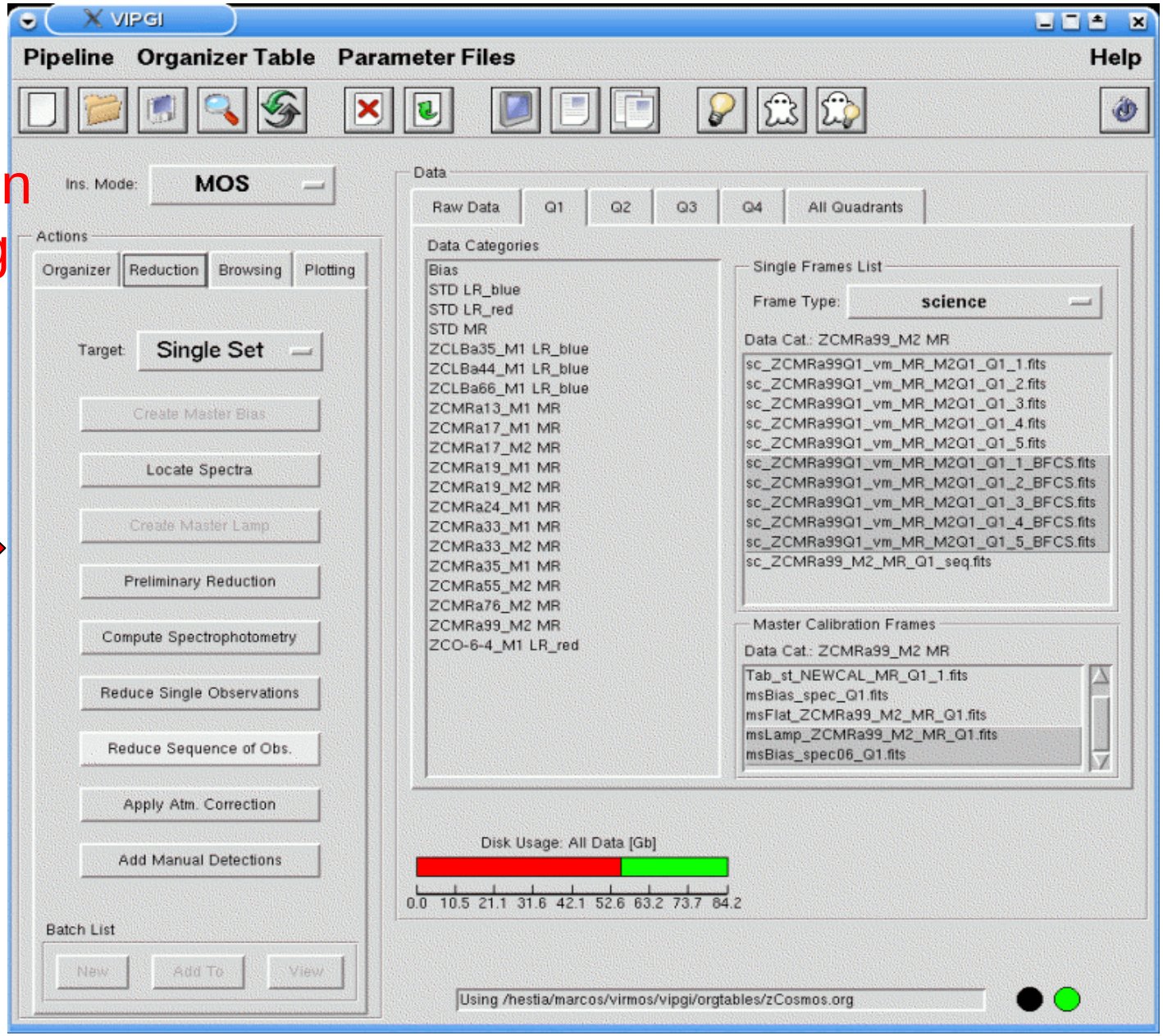
With contributions from:

- Marco Scodeggio
- Paolo Franzetti
- Bianca Garilli
- Alessandra Zanichelli
  (in Milano)

- Carlo Izzo
- Ralf Palsa
- Paola Sartoretti
  (at ESO)

VIPGI: The VIMOS Interactive Pipeline and Graphical Interface

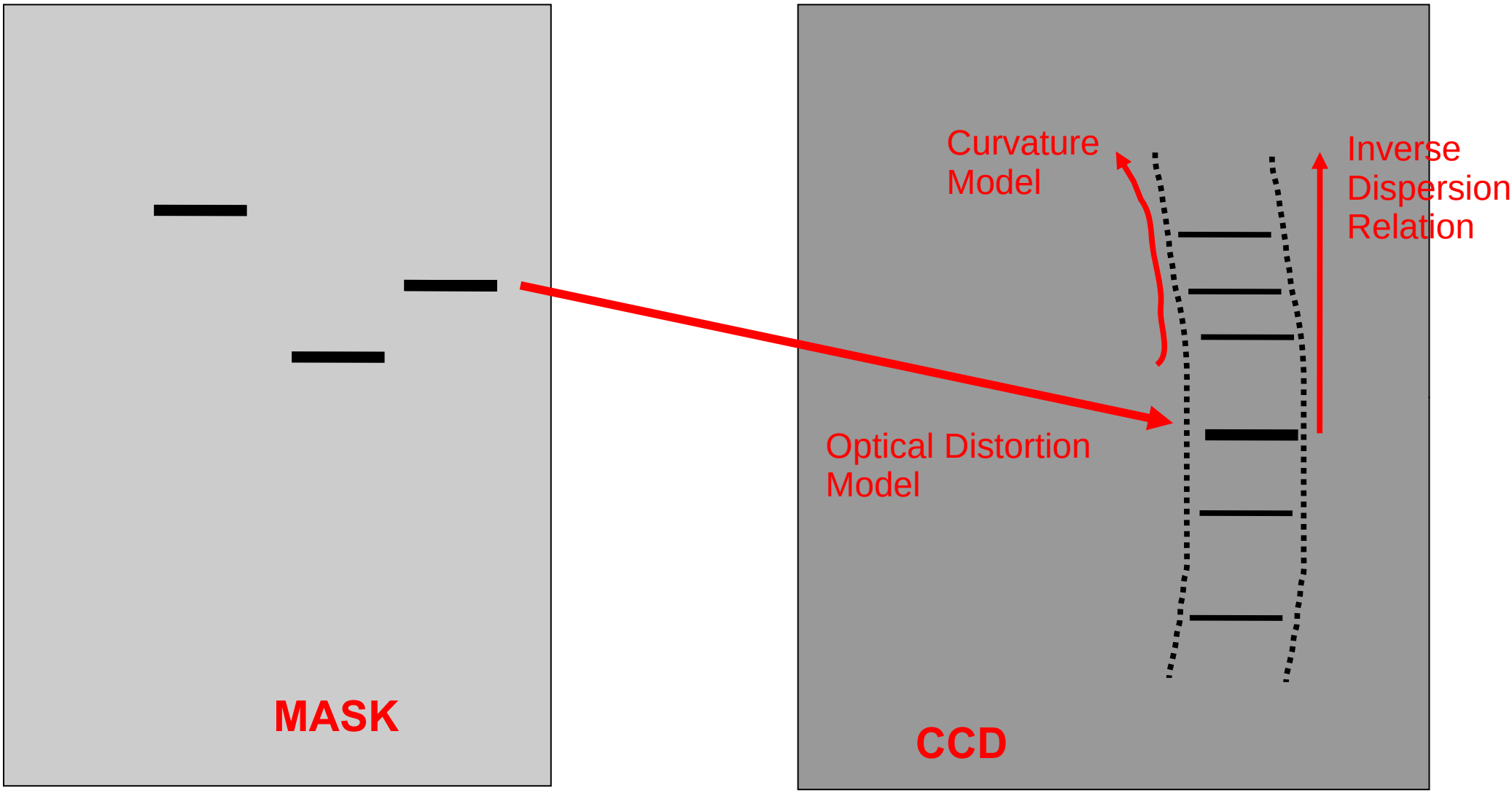
Reduction
Browsing
Plotting
tasks



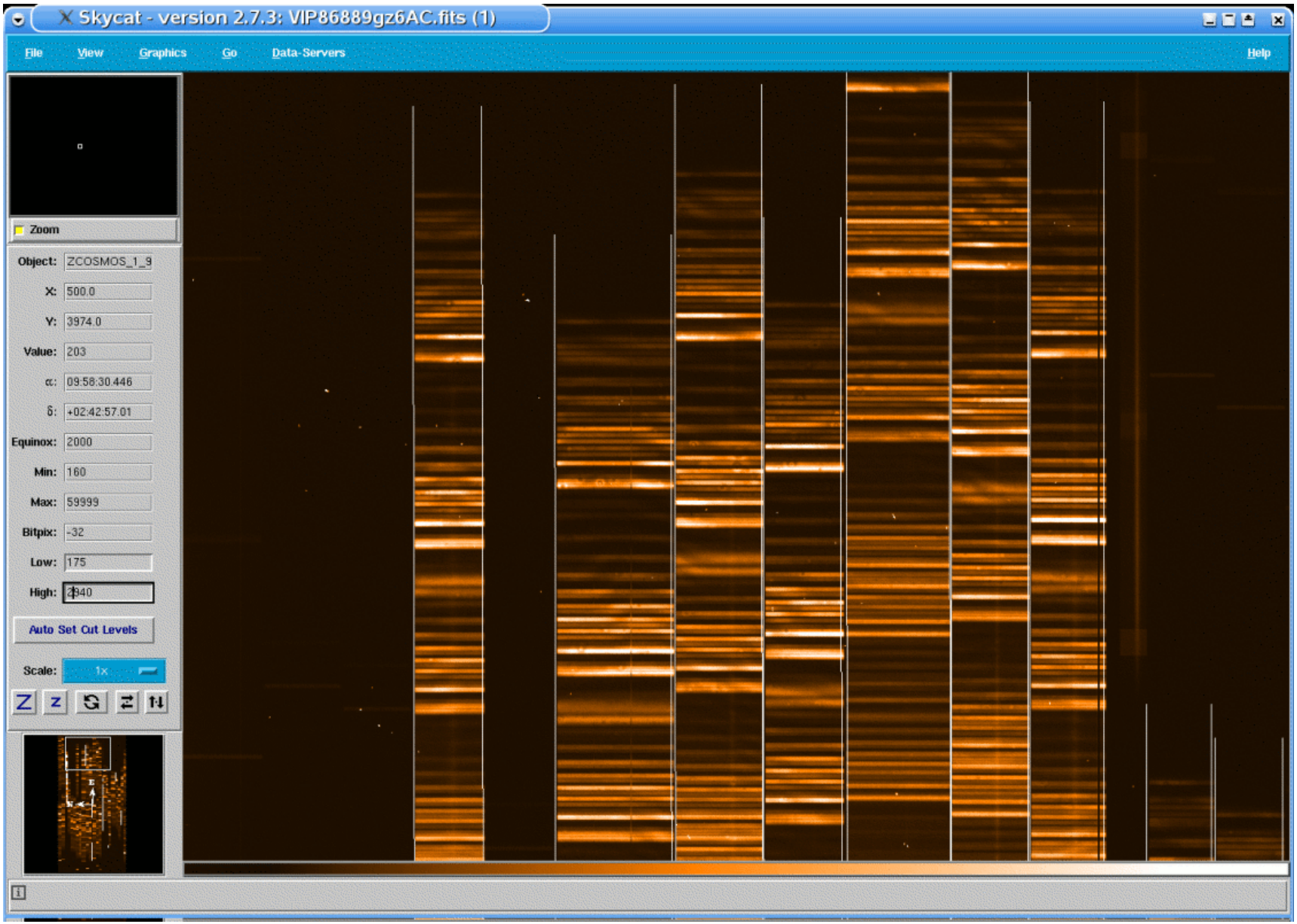
Data
Organizer

Pipeline and Instrument Calibrations: First Guesses

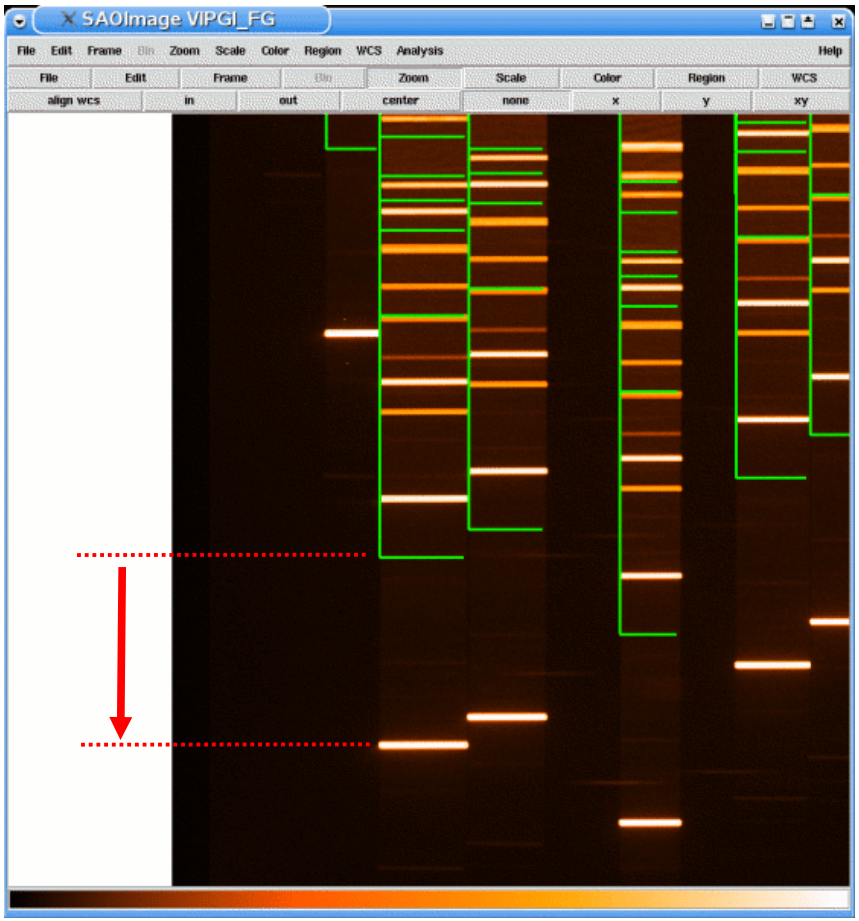
First Guesses: 3 mappings from the mask plane to the CCD plane

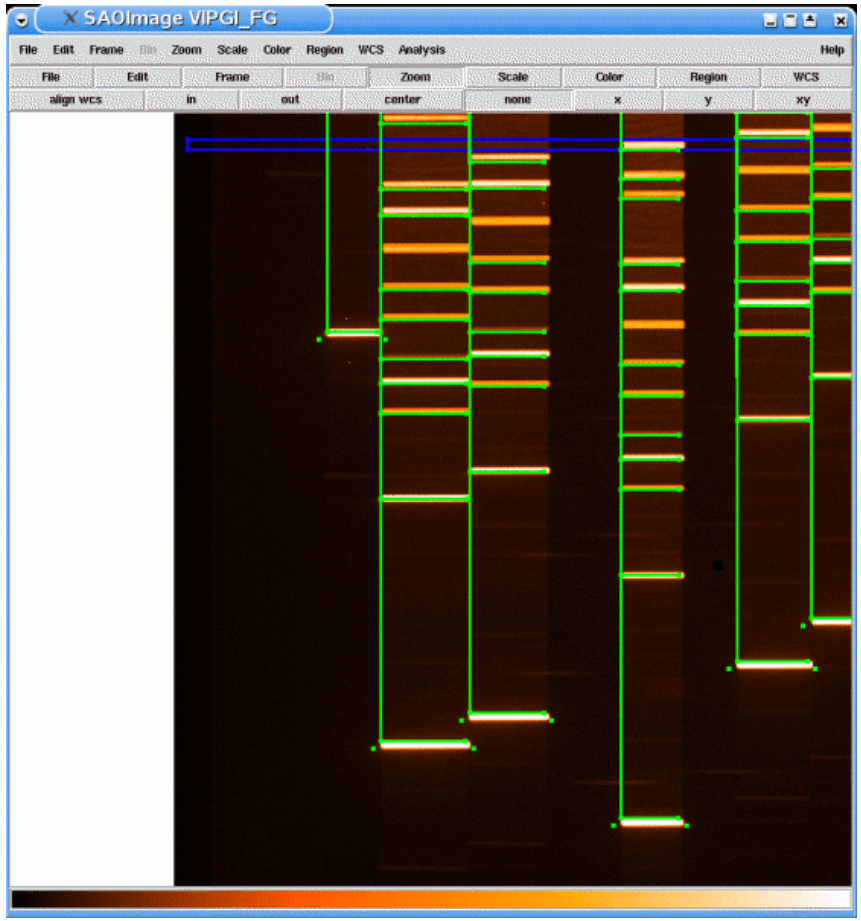


First Guesses Adjustment – Spectra Location



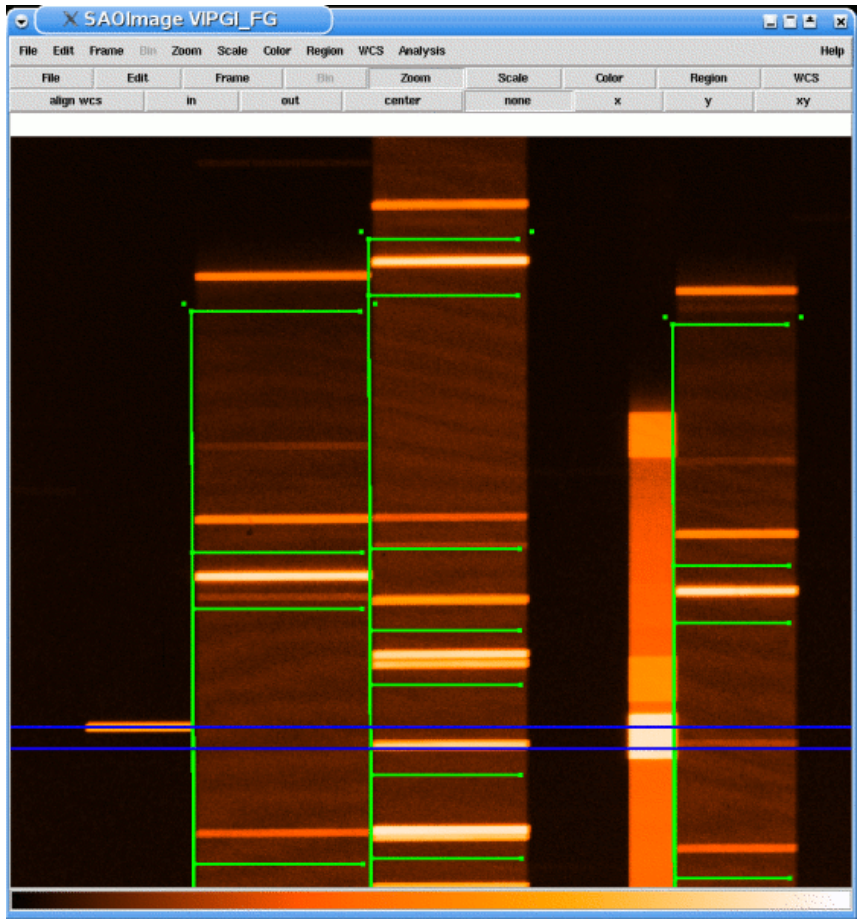
First Guesses Adjustment – lambda cal. part 1

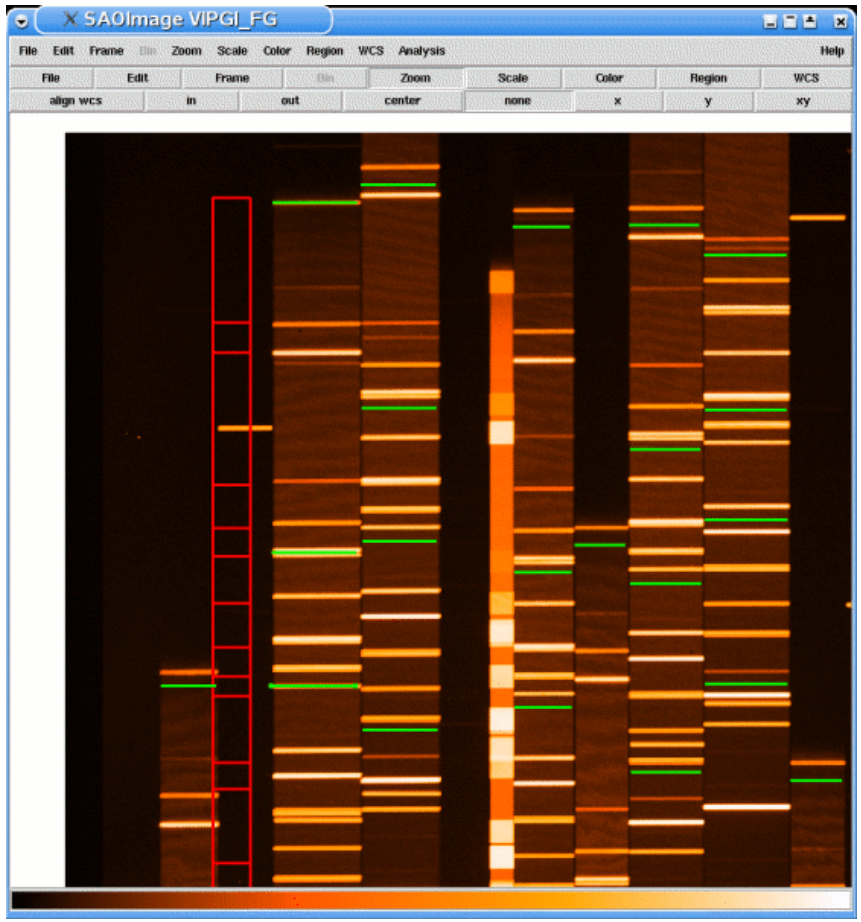




Use DS9 Regions for an interactive and very simple adjustment of First Guesses: here we see a global adjustment, which is in fact a rigid shift of the spectra location

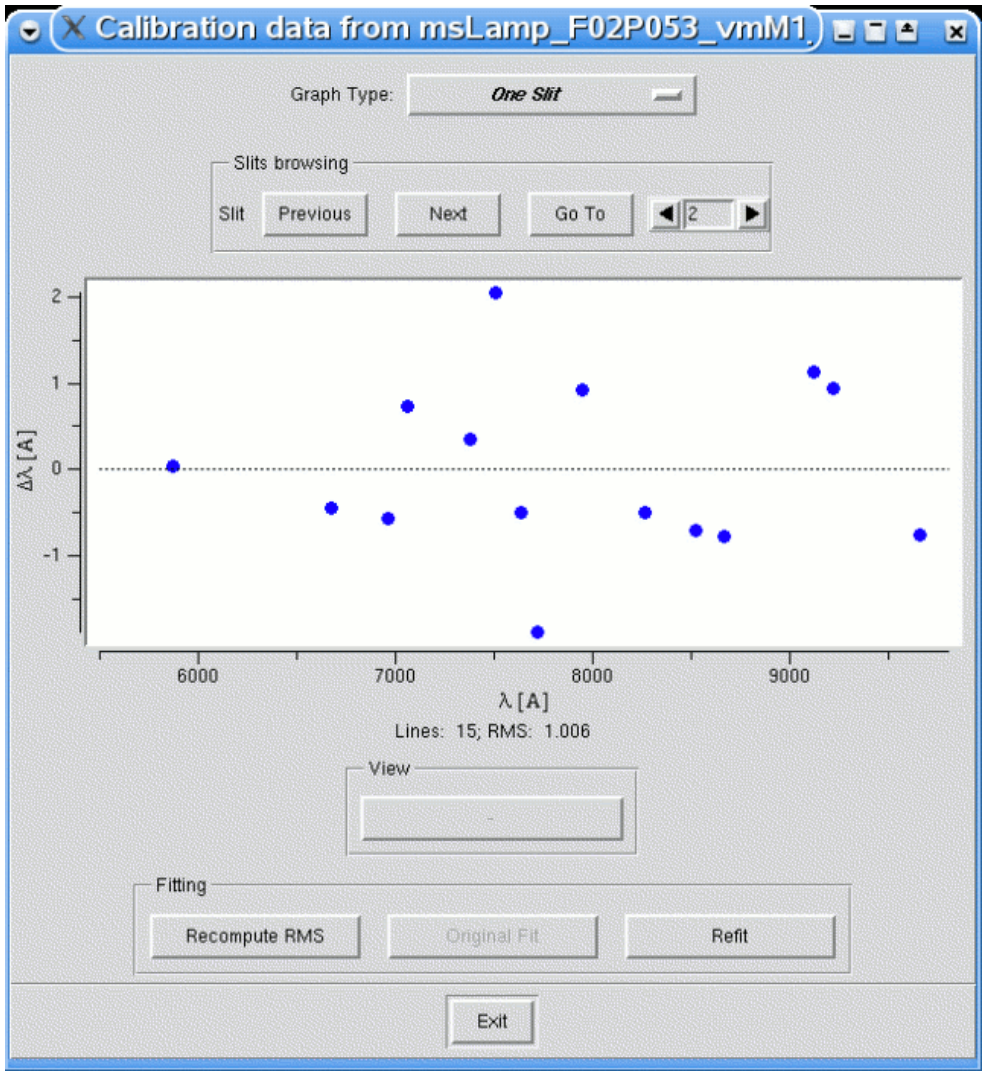
First Guesses Adjustment – lambda cal. part 2

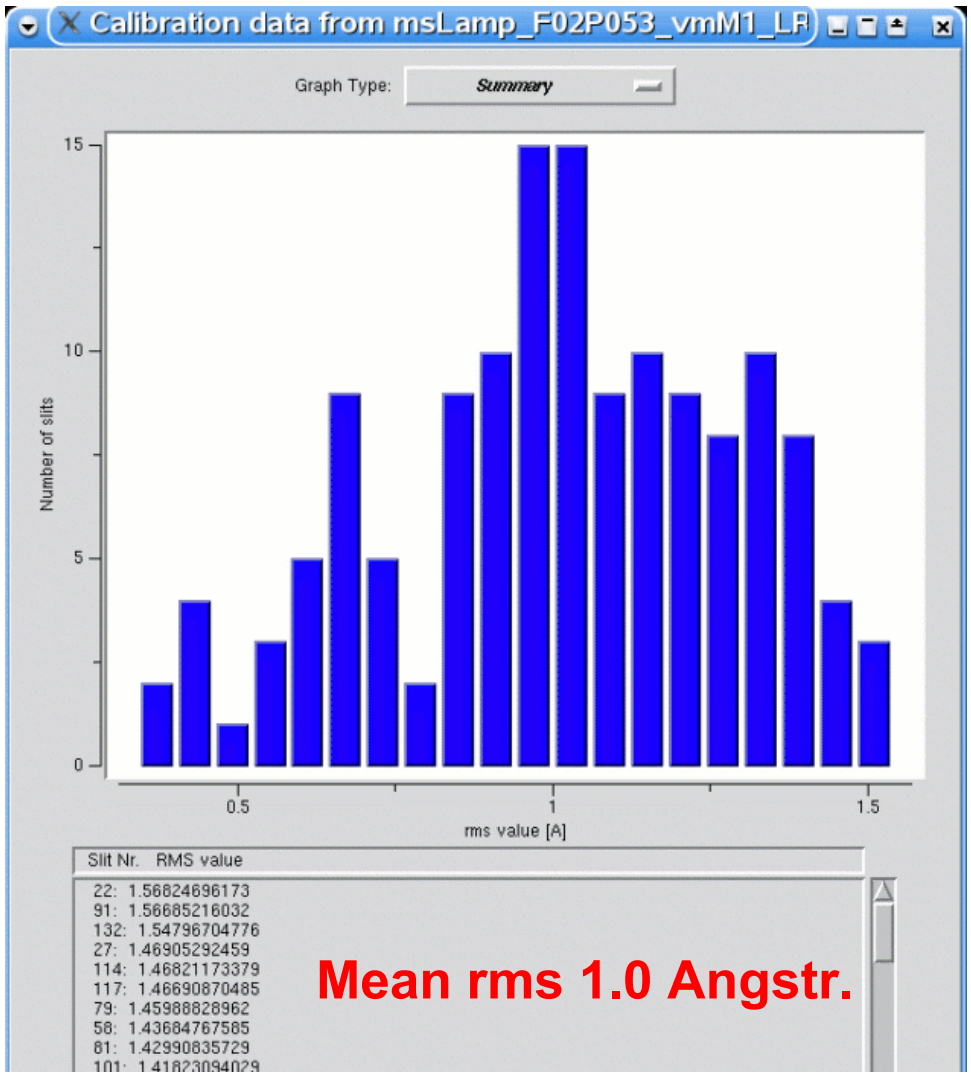




Often a global shift is not enough, and a detailed adjustment of individual slits becomes necessary: here we reposition individual arc lamp lines one by one

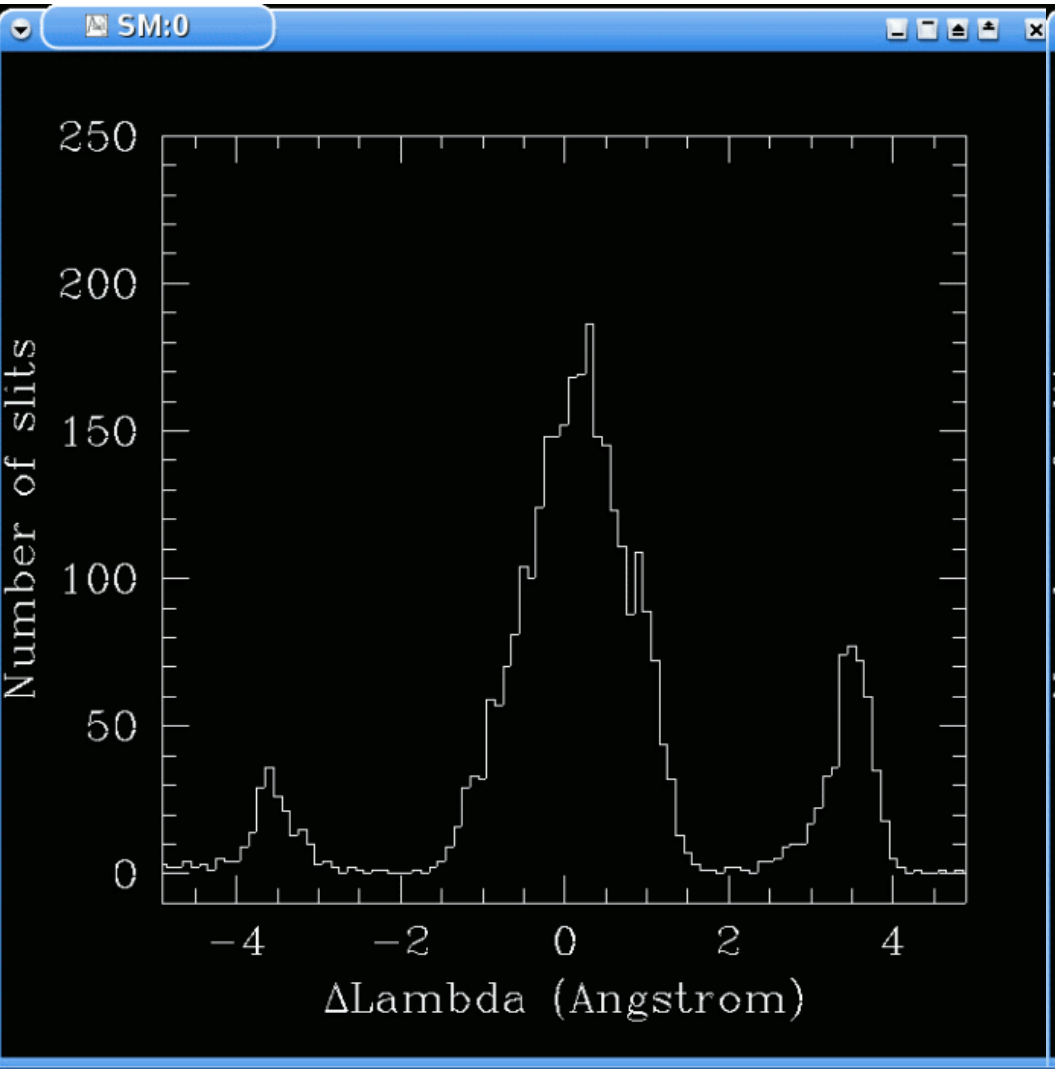
Lambda calibration results: the master lamp

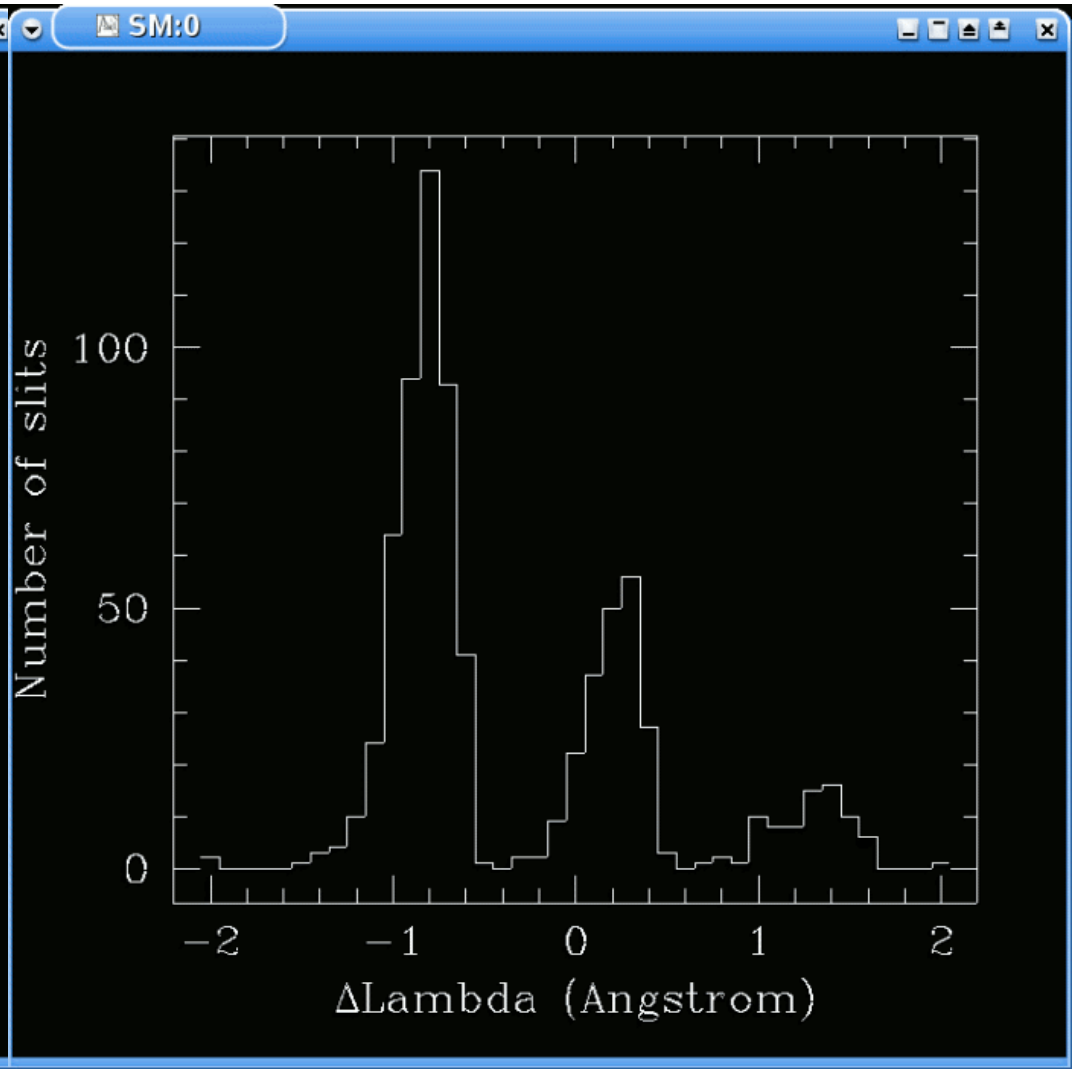




LR_red grism data: dispersion is 7.14 Angstr. / pixel

Lambda calibration results: the sky lines





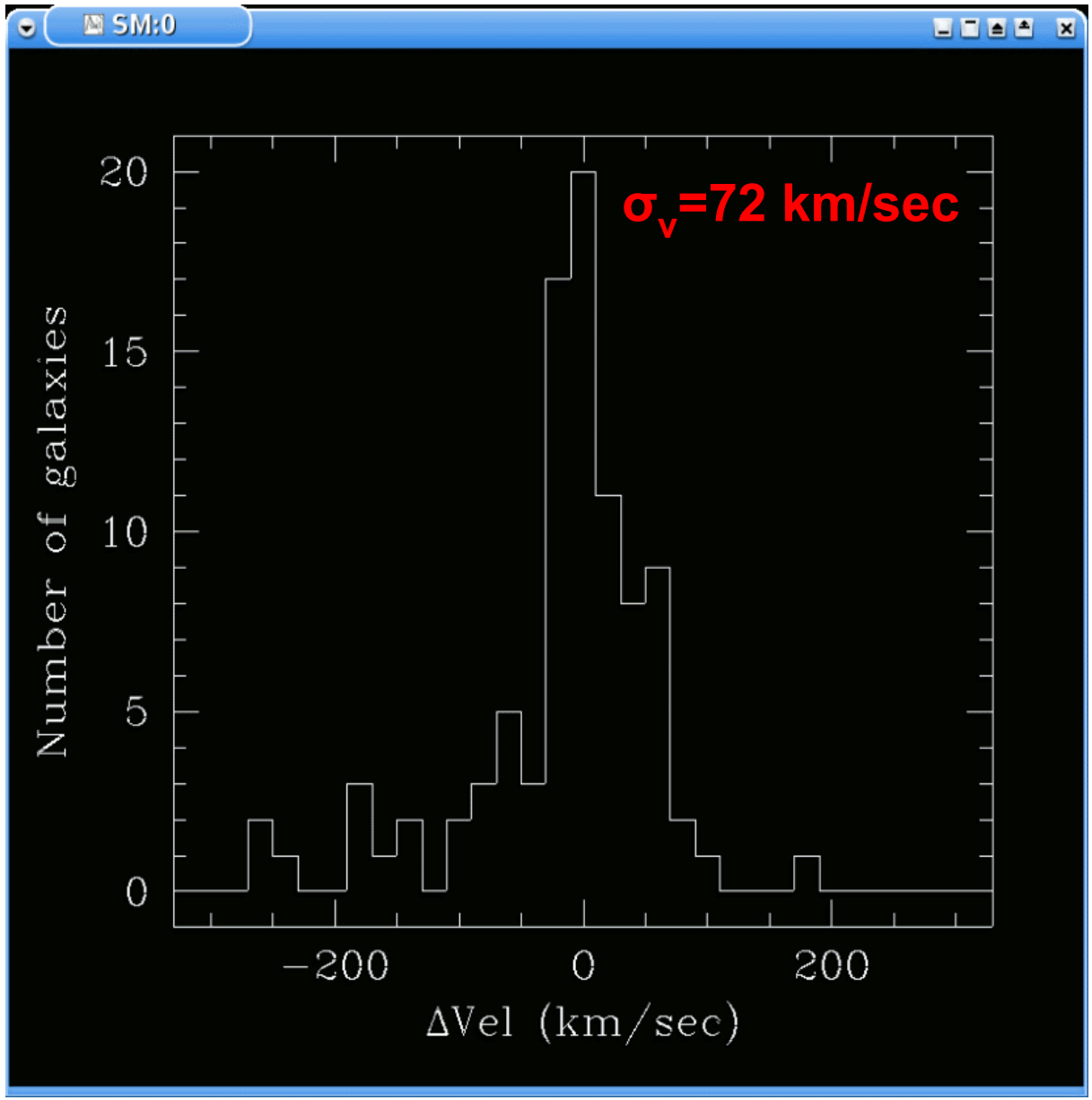
LR_red: disp. 7.14 Angstr. / pixel

MR: disp. 2.50 Angstr. / pixel

Redshift uncertainties from repeated measurements

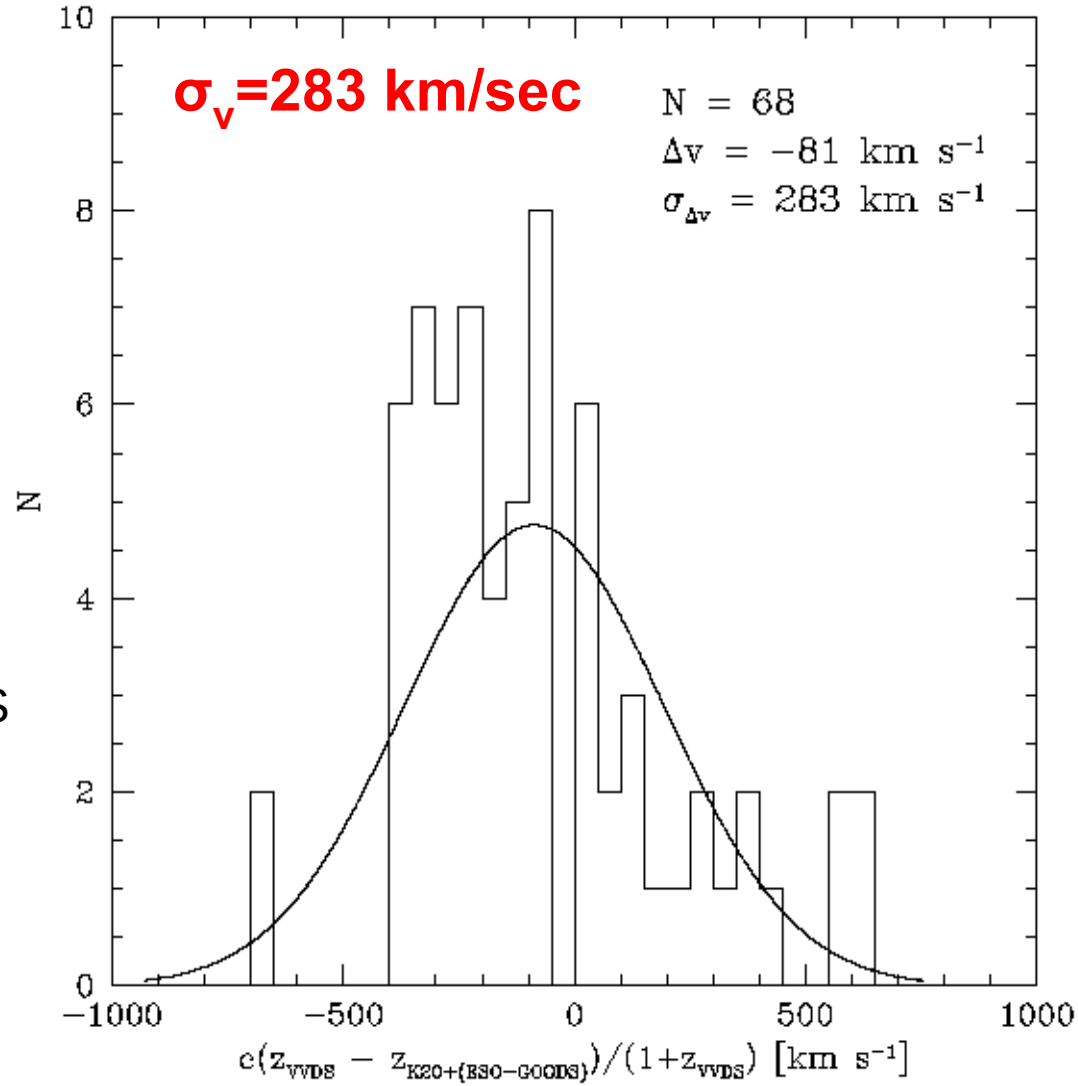
MR Grism R=580 (equivalent to 517 km/sec)

zCosmos data
one survey pointing observed twice



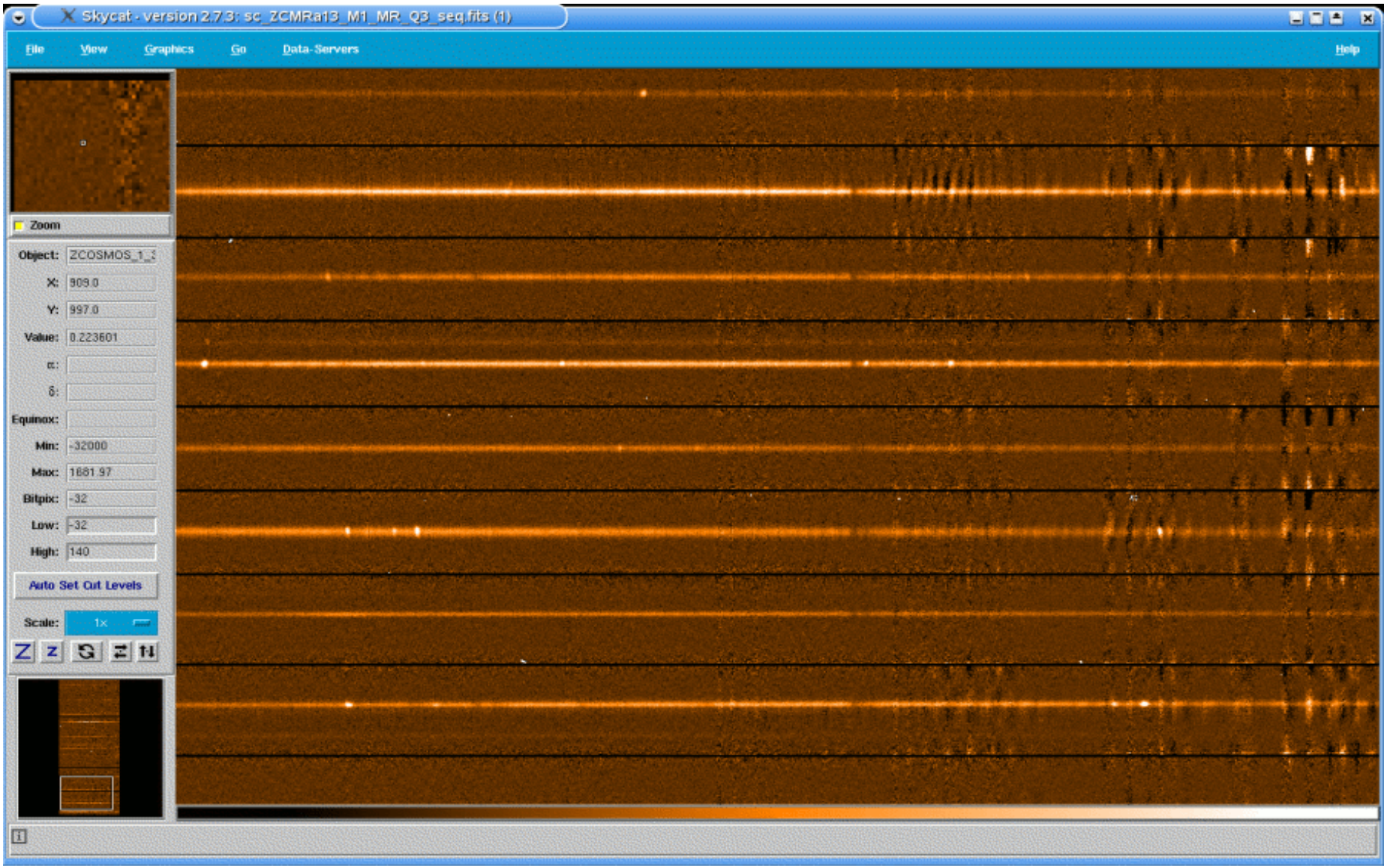
Redshift uncertainties from external comparison

LR_red Grism
R=210
(equivalent to 1428 km/sec)

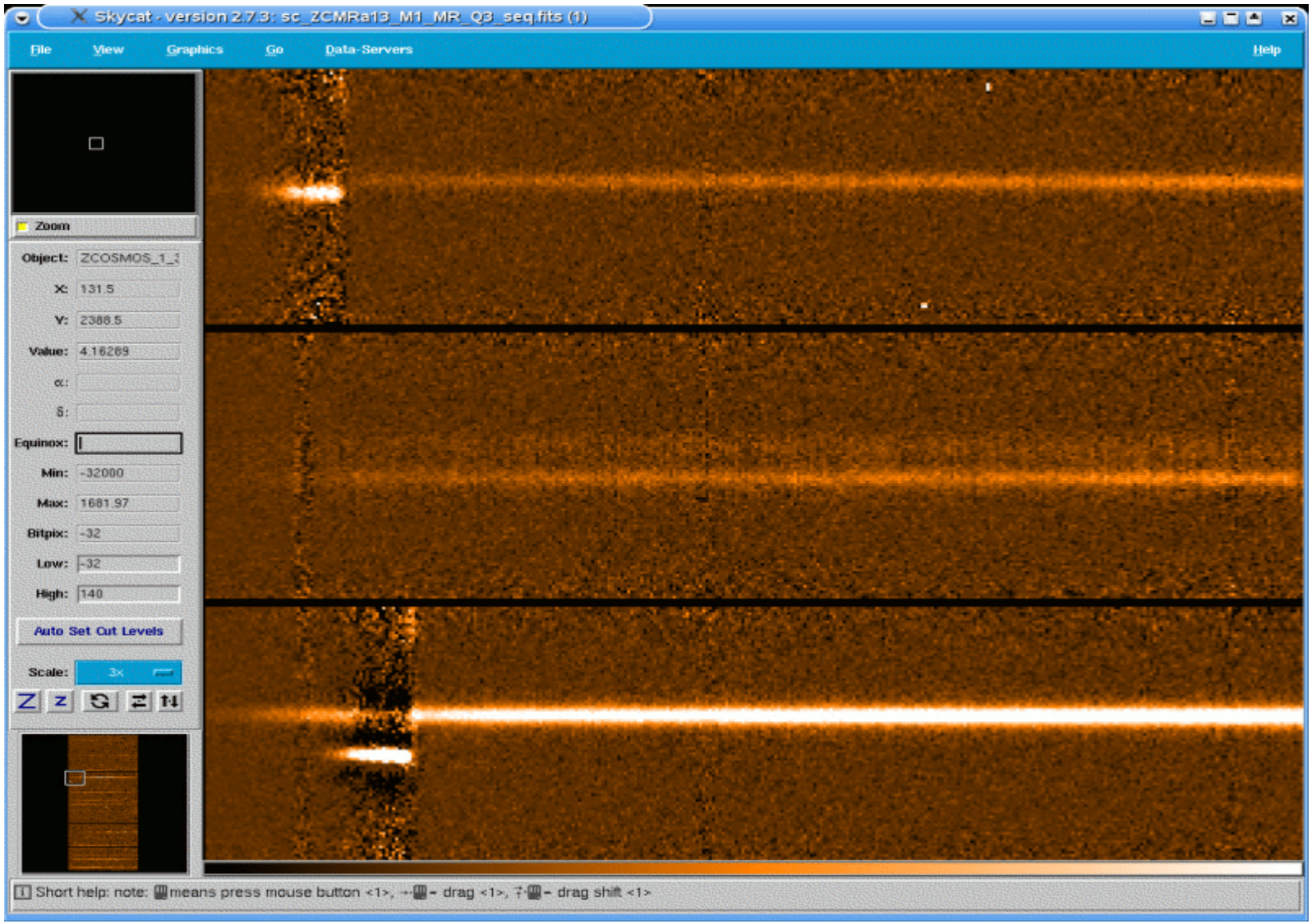


Comparison of VVDS and GOODS data in the HDF-South field

The problems: Fringing Residuals



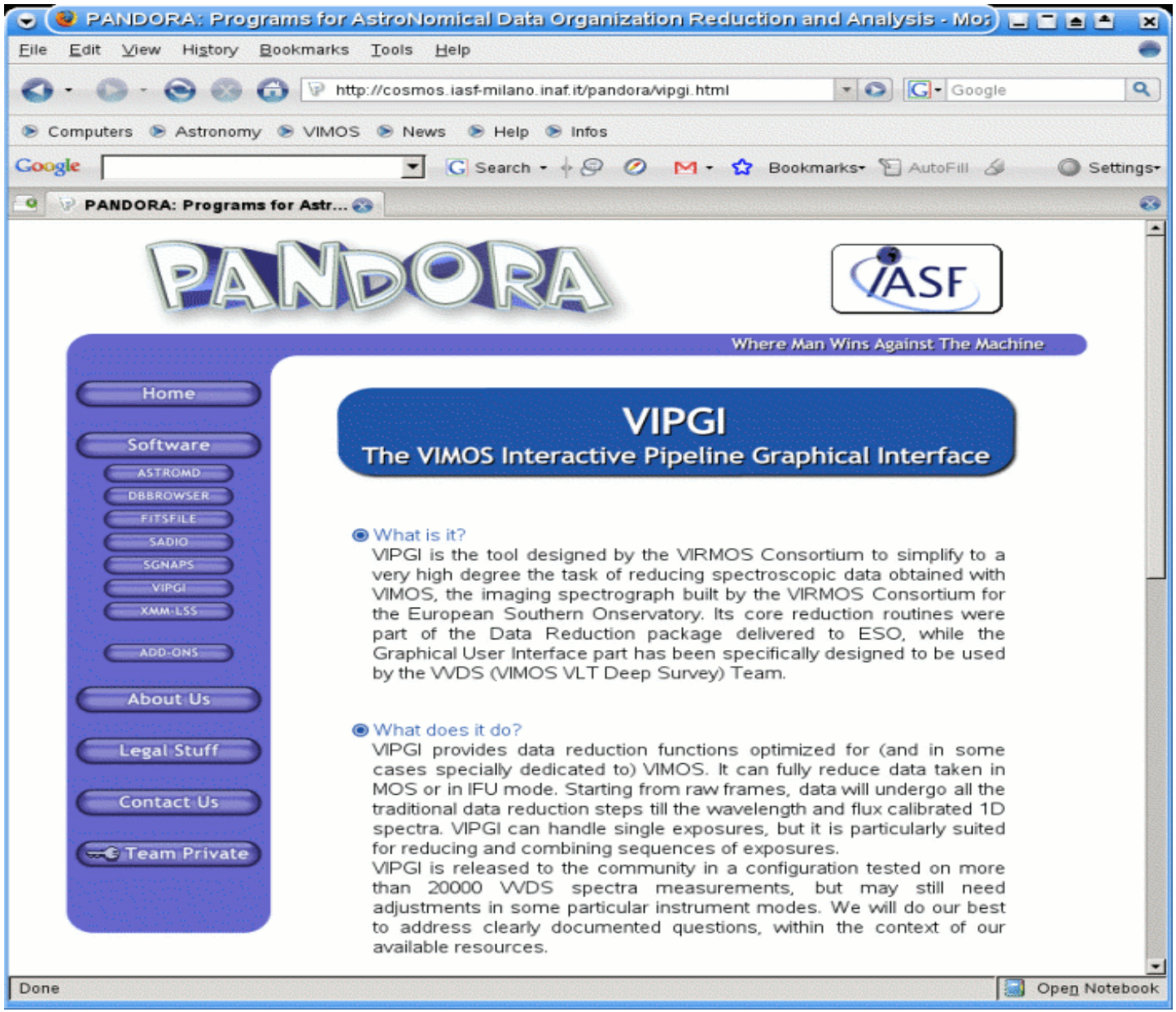
The problems: Zero Order Contamination



CONCLUSIONS

- lambda calibration results up to specs
- required human intervention for adjusting first guesses
- required human intervention for final refinement of lambda calibration
- we absolutely need to eliminate fringing
- we could benefit from a switch from the current many-single-slits approach to a global one-mask approach

VIPGI and other software



http://cosmos.iasf-milano.inaf.it/pandora